PROCEEDINGS

OF THE

AMERICAN PHILOSOPHICAL SOCIETY.

VOL. II. NOVEMBER & DECEMBER, 1841. No. 20.

Stated Meeting, Nov. 5.

Present, thirty-three members.

Dr. PATTERSON, Vice President, in the Chair.

Letters were received and read:—

From the Royal Society of Göttingen, dated April 20, 1841,—the Royal Society of Copenhagen, dated 3d May, 1841,—the Royal Academy of Inscriptions and Belles-Lettres, Institute of France, dated 20th August, 1841,—the Royal Academy of Sciences, Institute of France, dated 23d August, 1841,—and the Royal Geological Society of Cornwall, dated Penzance, 25th Sept, 1841; severally acknowledging the receipt of copies of the Transactions and Proceedings of the Society, and transmitting donations to the Library:—

From the Secretary of the London Electrical Society, dated 7th July, 1841, presenting the entire series of the Transactions and Proceedings of that Society:—

From Mr. Charles Nagy, dated Vienna, 10th March, 1841, accompanying donations to the Library, and referring to experiments, making under his direction, with the invariable pendulum:—

From Professor Palfrey, dated Boston, 28th Sept. 1841, presenting a copy of his Lectures.

The letter of Mr. Nagy was referred to a committee.

The following donations were announced:—

FOR THE LIBRARY.

Flora Batava. No. 122. Amsterdam. 4to.—*From H. M. the King of the Netherlands.*

Laws of Pennsylvania, passed at the Session of 1841. 8vo.—*From the Commonwealth.*

Verhandlingen van het Bataviaasch Genootschap van Kunsten en Wetenschappen. XVIIde Deel. Batavia, 1839. 8vo.—*From the Batavian Society of Sciences.*

The Transactions and the Proceedings of the London Electrical Society, from 1837 to 1840. London, 1841. 4to.—*From the Society.*

Proceedings of the London Electrical Society, Session 1841–42. Parts I. II. London. 8vo.—*From the same.*

De l'Application des Axiomes de la Mécanique et du Calcul Géométrique aux Phénomènes de l'Électricité, par Richard Laming. Paris, 1839. 8vo.—*From the same.*

Proceedings of the Academy of Natural Sciences of Philadelphia. Vol. I. Nos. 5, 6.—*From the Society.*

Historia Academiæ Scientiarum Pazmaniæ Archi-Episcopalis ac M. Theresianæ Regiæ Literaria. Buda, 1835.—4to.—*From Mr. Charles Nagy, of Hungary.*

M. Tudós Társasági Névkönyv Astronomiai Naplóval és Kalendáriommal, 1841–re. Buda. 12mo.—*From the same.*

Az égi és földtekék' használata, &c. Bécsben, 1840. 12mo.—*From the same.*

Auswahl aus den Diwanen des Mewlana Dschelaleddin Rumi. Vienna, 1838. 4to.—*From Mr. J. G. Schwarz, of Vienna.*

Armenische Vorschriften und Kalligraphien herausgegeben von P. A. B. &c. 2 Nos. Vienna, 1837. 4to.—*From the same.*

Verzeichniss der Chinesischen und Japanischen Münzen des K. K. Münz-und Antiken-Cabinetes in Wien, &c., von Stephan Endlicher. Vienna, 1837. Fol.—*From the same.*

Catalogue of Skulls of Man and the Inferior Animals, in the Collection of Samuel George Morton, M.D., &c. &c. Philadelphia, 1840.—*From the Author.*

Review of the Crania Americana, from Silliman's Journal.—*From the same.*

Memoir of William Maclure, Esq. &c. By S. G. Morton, M.D. &c. 1841.—*From the same.*

Lettre sur le Rhopalodon, genre du Saurien Fossile du Versant Occidentale de l'Oural, par G. Fischer de Waldheim, &c. &c. Moscow, 1841. 8vo.—*From the Author.*

Catalogue of the Officers and Students of Bowdoin College. 1841.—*From Mr. D. R. Goodwin.*

Société Royale et Centrale d'Agriculture: Bulletin des Séances. Tome II. No. 5. June, 1841.—*From Mr. D. B. Warden.*

Tracts. Catalogues of Collections of Rocks, Fossils and Petrifactions, published by the Heidelberg Mineralogical Institute, 1841. Plusieurs Rapports à la Société d'Agriculture, &c., par M. le Baron de Mortemart de Boisse, Rapporteur. Des Haras en France, &c. &c. &c.—*From the same.*

The American Medical Library and Intelligencer, &c. N. S. Vol. I. No. 4. By Robley Dunglison, M.D. &c. &c.—*From the Editor.*

The Charter of Privileges, granted by William Penn,—and Laws of the Government of Newcastle, Kent and Sussex, upon Delaware. Philadelphia, 1741. Fol.—*From Mr. Meigs.*

FOR THE CABINET.

Typographical Specimens, from the Typometry of Mr. Raffelsperger, of Vienna, including Maps, Portraits, &c.—*From Mr. J. G. Schwarz, of Vienna.*

The Committee, consisting of Dr. Horner, Mr. Wetherill, and Dr. Goddard, to whom Dr. Harlan's paper entitled, "Description of the Bones of a Fossil Animal of the Order Edentata," was referred at the last meeting, made a report recommending its publication in the Transactions; which was ordered accordingly.

These bones form part of the extensive collection of fossils recently exhibited in Philadelphia, by Mr. A. Koch, by whom they were obtained in Benton County, Missouri.

Among them, more or less perfectly preserved, are two ossa humeri, two tibiæ, two portions of the radius, two of the clavicle, parts of several ribs, twelve vertebræ, a cubitus, twenty-four teeth, eight of them in their sockets, two fragments of a lower jaw, with two and three teeth *in situ*, two fragments of the upper jaw, five ungueal pha-

langes, the sternum of four articulated pieces, and a part of the ilium and sacrum.

These specimens apparently belonged to three individuals of the same species. They were found, with portions of a mastodon, in company with numerous tropical vegetable remains. They are friable and light, not petrified, but destitute of animal matter.

The teeth are very similar in structure to those of the Megalonyx, though the pieces of the lower jaw are stouter: the jaws may have contained six or seven teeth on each side.

The largest os humeri is twenty inches long, and fourteen in diameter; it is of a massive structure, and deeply grooved by the muscular attachments. In place of a foramen, as in the humerus of the Megalonyx, the exterior surface, near the elbow joint, has a deep groove, for the origin of the flexor muscles. The condyles are of great breadth, as in the Megatherium. The inferior articulating surface consists of two facets, one exterior and convex, the other described by Dr. Harlan as concavo-convex, admitting a ginglymous and rocking motion.

The cubitus or ulna is a short and strong bone, with strong marks of muscular attachments: this was part of an animal of less size than that to which the large humerus belonged. A peculiarity of this bone consists in the position of its superior articulating surface, which is nearly in the middle of its shaft; the olecranon process being very long, and extending upwards. The lower articulating surface was articulated with the carpal bones, as well as the radius. The total length of this bone is sixteen inches.

There are four claws, or phalangeal bones of the fore-foot of a small-sized individual: in general form these bones approach nearest to those of the Orycteropus.

There are two tibiæ belonging to different individuals of different sizes: one is ten inches five-tenths in length, the other ten inches. This is a short, thick and strong bone. Its upper articulating surface is nearly a circular concave disc. Its lower anterior extremity is marked by a peculiar deep ovoid depression, or hollow, for the reception of a corresponding hemisphere, projecting upwards from the astragalus; forming together, a structure of joint altogether unique. The motions of the ankle joint were rotatory, but the articulating surface of the lower aspect of the astrogalus admitted of ginglymous motion with the os calcis.

The clavicle and ribs, portions of which only exist, are not distinguished by any remarkable characters: but the foramen for the pas-

sage of the spinal marrow, in the vertebræ, is exceedingly small, an unaccountable feature in a skeleton, which in all other respects, demonstrates great physical strength as one of its most remarkable characteristics.

The portion of sternum belonged most probably to the largest of the three individuals; the animal being apparently less than the Megatherium and larger than the Megalonyx.

Dr. Harlan proposes to name this animal "Orycterotherium Missouriense."

Professor Henry, of Princeton, gave a verbal account of a series of experiments he had made on Magnetic Distribution, and which he intended to present as the fifth number of his contributions. A full account of these experiments will be given hereafter.

Professor Henry also gave an account of some observations he had made on the effects of a thunder storm which visited Princeton on the evening of the 14th of July, 1841.

Storms of this kind, he said, are not very frequent at Princeton: but two severe ones have passed immediately over the place within the last nine years, and the lightning has struck but twice in the village, during the same time. It is thought by some of the inhabitants, that damage by lightning was more frequent some years ago than it has been lately; and the idea has been suggested that the water of the canal, which passes to the south of this place, may have had some effect in determining the course of the cloud. Be this as it may; the thunder storm generally comes from the south-west, and before it reaches the village it usually divides into two parts, one of which passes along the edge of Rocky Hill, and the other along the valley of Stonybrook, so that the principal part of the storm seldom passes immediately over the village; and when it does thus pass it is generally at a great elevation, and the thunder is not so loud as that which the observer has been in the habit of hearing at the north. In connection with this remark, Prof. Henry mentioned, that he has several times observed the lightning assume a beautiful violet colour, similar to that of the vapour of iodine, and this was particularly the case during a storm which occurred on the 12th of April, 1840. On this occasion, although the cloud and the flashes appeared directly over head, yet the sound of the thunder seemed to come from a distance. The peculiar colour may, perhaps, receive a sufficient explanation, by refer-

ring it to the fact of the discharge taking place at a great altitude, and consequently in comparatively rarefied air, as in the case of the colour exhibited by the spark through a vessel partially exhausted.

The storm of the evening of the 14th of July, was said to be more severe than any which had visited Princeton for twenty years before. It commenced between 7 and 8 o'clock, and lasted about three hours; the thunder was almost continuous, but, except in two or three cases, it was not very near. Several buildings and other objects were struck in the vicinity of Princeton, and also Mrs. Hamilton's house, which is situated in the village, about 20 rods west of the college, on the opposite side of the way. It seemed a little surprising that this house should be singled out, since the buildings on either side are considerably higher, although at a few rods distance; and in front of the one to the west is a number of tall trees. The house is also furnished with a lightning rod; but this, like most of the rods erected in the country, is not formed in accordance with the most scientific principles. The front of Mrs. Hamilton's house is parallel with the main street, and is nearly in an east and west direction. The building is of brick, with a shingle roof, and two stories high: it has on the front three upper windows, and two windows and a door below; the latter being immediately under the western upper window. The chimney is on the eastern end, and the lightning conductor is supported against this. The rod is formed of round iron, three-eighths of an inch thick, and the several parts of it are imperfectly connected by hooks and eyes. It appears to be merely thrust into the ground to the depth of about two feet, and is terminated above by three prongs instead of one; the points of which are blunted by long exposure, but do not exhibit any appearance of fusion. The top of the rod is not more than six feet above the ridge of the roof; and since the house is about thirty feet long, the farther end of the ridge is unprotected. A point, according to the experiments of Mr. Charles, can only protect a circular space, the radius of which is not greater than twice the height of the point above the plane to be protected.

The lightning, according to the accounts of several persons, came from a cloud situated to the south-west, and the discharge did not strike the most elevated part of the building, but the western end of the horizontal wooden gutter which extends along the front of the house under the eaves. This point is at the greatest possible distance from the extremity of the lightning rod, and perhaps as near to the cloud as any other part of the building. The discharge immediately divided itself into two parts: one of these, and probably the larger,

passed along the gutter, which must have been filled with water at the time, to the eastern end of the same, and then down to the earth along an ordinary tinned-iron pipe or conductor, which conveys the water from the gutter to the pavement below. Marks of its passage were observed along the gutter, and particularly near the end next the metallic conductor. The other part of the discharge passed immediately downward through the end of the gutter which first received the shock, to the casing of the window below; and was probably thus deflected out of its course by the attraction of the iron hinges and bolts of the shutters. Its course to the ground was further traced along the casings on each side of the front door. The wood was cracked at every place where a nail happened to be in the line of the discharge, and at some places the lightning appeared merely to pass along the surface making a groove in the wood of about one-eighth of an inch in width, and six or seven inches long: several of these grooves were observed on the side casings of the door. Three panes of glass were broken in the window above the door, and the pieces were thrown inward. The entrance within the door was filled with dust, and a strong sulphurous odour was perceptible for an hour or more after. No marks of a discharge were found at the foot of the lightning rod.

During the storm, several females were alone in the house, and at the time it was struck, three of these were in the front room in the second story, and consequently near the line of the discharge along the gutter. Two were on a bed placed against the partition wall, opposite to the front, and the third female was standing on the floor about eight feet from the front window, with her face to the same. Those on the bed were unaffected; but the one on the floor stated that she felt a sensation on her right ear, as if it had been touched with a live coal; at the same time she felt a rushing sensation down her side and perceived a flash at her foot, and a forked spark in the air between her and the nearest window. One of the persons on the bed also stated that she saw the forked spark in the air, and that the female on the floor appeared to her for an instant as if surrounded with light. The outside shutters of the window opposite to which the female was standing, were closed, and also one leaf of the shutters of the window farther east. The western window, or that from which the glass was broken, was not in the same room, but in a small adjoining one, over the main entrance from the front door. The chamber door was shut at the time, and no marks of the entrance of the

electricity into the room could be found on the walls or on the casings of the two windows.

The principal facts here detailed, although perhaps not unusual occurrences, afford interesting illustrations of the action of electrical induction. First, the horizontal gutter and the vertical tin pipe, both filled with water, formed a long continuous electrical conductor, extending from the point where the lightning first struck to the lower farther corner of the front of the house; and this conductor, on account of its length, would be intensely affected by the induction of the distant cloud, or rather by that of the approaching discharge. If the electricity of the cloud were positive, then that of the water in the nearest end of the gutter would be negative, and, consequently, a powerful attraction would determine the lightning on the point where it struck. The house, under these circumstances, might have been damaged even had the rod been much higher than it was, and its connection with the earth much more perfect.

Again, the phenomena exhibited to the females in the upper chamber were also most probably due to inductive action. After a proper allowance for imperfect observation, occasioned by the fright and confusion of the moment, it is still evident that the female on the floor was in some degree affected by the discharge, although none of the electricity of the cloud actually entered the room, since no traces of it were to be found on the walls or other parts. The effects may therefore be referred to the inductive action of the lightning at a distance and through the wall, as it passed along the gutter across the front of the house. When a shock of electricity from a Leyden jar is passed through a slip of tinfoil pasted on one side of a pane of glass, the hand on the other side will receive a slight sensation from the lateral induction through the glass. In the same way, it may be supposed, that the effects perceived by the females were due to the disturbance for an instant of the natural electricity of the chamber, by the passage of a large charge along the outside of the house.

The discharge, as has before been stated, came from the southwest, and in its passage it crossed obliquely some houses on the opposite side of the street. In one of these, two persons were sensibly affected by the shock; and another, in a room with the windows closed, according to her own statement, saw sparks of electricity on the floor. The same explanation will also apply to these effects.

During the same storm, another house about three miles southwest of the village was struck, and this also was furnished with an imperfect conductor. The upper part of the rod had been broken,

and it hung down, so that no part was above the chimney. The lightning struck the eastern chimney, which was on the end of the house opposite to that to which the rod was attached, and passed down the inside of the flue to the kitchen fire-place, in which wood was burning at the time. It threw down a great quantity of soot, filled the lower rooms with smoke, and diffused, according to the account, a strong smell of gunpowder. A part of the charge passed to the outside through the thick stone wall which forms the back of the chimney, and was evidently attracted by the iron hoop of a large cask which was nearly against the wall. It made a triangular hole, as if the stone and mortar had been burst outwards by an explosive force, and this was directly opposite the nearest part of the hoop. It then descended along the cask to the ground, breaking off all the wooden hoops in its course, while those of iron were undisturbed. The house is about sixty feet long; and from the state of the rod, the greater part of this distance might be considered as unprotected. The stroke fell on the end most remote from the approaching storm, and probably the lightning was drawn to this chimney rather than the other on account of the heated air which was escaping from it at the time.

Effects were also produced in this case, which can only be explained on the principles of induction. Three persons, the man of the house, his wife and son, all took refuge on a bed in a room separated from that through which the chimney passes, and upwards of twenty feet from the line of the electrical discharge. They were all lying across the bed, with their feet hanging down the side, and they each received a shock in the knees and lower joints of the legs. The female stated that the feeling was precisely like that which she had experienced from a shock from an electrical jar. No marks of the entrance of any part of the discharge from the cloud were found on the plastering or any other parts of the room; the effect can therefore only be accounted for, by a sudden disturbance of the equilibrium of the natural electricity of the space within the room.

The induction of an electrical cloud is often exerted at an astonishing distance. It has long been known, that a delicate gold-leaf electrometer is sometimes affected by the presence of an electrical cloud immediately over head; but Dr. Ellet, professor of chemistry in the college of South Carolina, has informed Professor H., that if one of Dr. Hare's single-leaf electrometers be furnished with a pointed metal rod attached to the cap, and then placed on the sill of an open window in the upper story, the leaf will be seen to touch the

ball at the moment of a flash, although the lightning is several miles distant.

Prof. Bache gave an account of the formation of cumulus cloud from the action of a fire, as witnessed by him in the month of August last, at Ellicottville, in the state of New York.

The place where this phenomenon was observed is nearly surrounded by hills; the valley in which it is situated extending to the southward. Near the foot of the hills on the north side of the village, a fire was made of the heavy timber which had been felled in clearing a small tract of land. The column of heated air from the fire, made visible by the smoke and condensing vapour, rose almost vertically, widening irregularly as it rose, curling over at the sides and reaching various heights. On one occasion, when the height of the column, judging from the known distance of the fire and the angle of elevation, was about three-tenths of a mile, the top flattened out, presenting a mushroom appearance. The smoke having been left behind in the ascent of the heated air, the condensed vapour forming the top of the column and presenting precisely the appearance of a cumulus cloud, was carried slowly to the westward; rising gradually and at first enlarging itself, it next became feathery at the edges, and finally disappeared. The lower current of air was from the S. W., and moderate in force. An upper current, as shown by the direction of the small cloud just described, was passing at a small elevation from the N. N. W.

A second time a small cumulus cloud formed, at the distance of about two hundred yards above the smoke from the fire, and without visible connexion with it. This cloud enlarged in its ascent until, when about the same height as the former cloud, it began to move from the N. N. W. It next separated into two parts, one rising rapidly, and in turn breaking into two portions; the whole three small masses thus formed being carried slowly from the N. N. W., and the two lower ones gradually disappearing. A detached cloud of the same kind gradually formed to the leeward of the upper remaining one, presenting the general appearance, upon a small scale, of the detached masses which may be seen to form in the neighbourhood of thunder clouds in the summer season.

These observations were made on the 16th of August, between 1½ and 2 P. M. The temperature of the air was 80°, the evaporating point 64°, and the height of the barometer 28.74 inches. From these

data the dew point may be calculated by Dr. Apjohn's formula to have been 52° 9.

The report, presented at the last meeting by the Committee on the Communications of Mr. Du Ponceau and Mr. Fisher, was considered, and the resolution with which it closed was adopted.

The Committee review in their report, the papers which were referred to them, and take notice also of some additional facts that bear upon the same subject. In conclusion, they congratulate the Society on the important accession to the knowledge of our early history, which has resulted from the labours of Mr. Du Ponceau and Mr. Fisher. Yet it must be admitted, they say, that chasms still remain in our early annals which require to be filled up; that doubts exist on some points, and discrepancies of opinion on others. The question arises: Shall we give publicity to the Society's early history in its present imperfect state, or shall we delay in the hope of obtaining more facts? The Committee express themselves in favour of the latter course, and recommend the adoption by the Society of the following resolution:

Resolved, That the papers of Mr. Du Ponceau and Mr. Fisher, which were read on the 26th of June, 1840, together with the supplementary communications, be deposited in the Archives, as valuable contributions to the early history of the Society.

Mr. Du Ponceau, by permission of the Society, withdrew his communication for the purpose of revising it.

Stated Meeting, November 19.

Present, seventeen members.

Dr. Patterson, Vice President, in the Chair.

A letter was received and read from Jac. Berzelius, Perpetual Secretary of the Academy of Sciences of Stockholm, dated 28th September, 1841, acknowledging the receipt of the Transactions and Proceedings of the Society.

The following donations were announced:—

FOR THE LIBRARY.

Proceedings of the Geological Society of London. Vol. III. Part 2. No. 77. 1841. 8vo.—*From the Society.*

Proceedings of the Botanical Society of London, from July, 1836, to Nov. 1838. 1839. 8vo.—*From the Society.*

Ad Runographiam Scandinaviæ Accessiones Novæ. Upsal, 1833. 4to.—*From Mr. Du Ponceau.*

Vocabularium Værendicum. Upsal, 1839. 8vo.—*From the same.*

Kort Beskrifning om Provincien nya Swerige uti America, Com nu förtjden af the Engelske kallas Pensylvania, af Thomas Campanius Holm. Stockholm, 1702. 4to.—*From Professor J. H. Schröder, of Upsal.*

Maison de Commission pour l'Etranger, de Hector Bossange, &c. Paris, 1841. 8vo.—*From M. Bossange.*

Notes on the Use of Anthracite in the Manufacture of Iron, &c. By Walter R. Johnson, A.M. Civil and Mining Engineer, Professor, &c. &c. Boston, 1841. 8vo.—*From the Author.*

FOR THE CABINET.

An Engraved Portrait of Alexander Von Humboldt.—*From Mr. John Penington.*

Messrs. Saxton and Gobrecht of the U. S. Mint, presented an engraved Seal for the use of the Secretaries.

The Committee, consisting of Professor Bache, Dr. Patterson and Professor Henry, to whom Mr. Nagy's letter was referred at the last meeting, presented a report; and in pursuance of their recommendation, it was resolved by the Society, that Mr. Nagy of Vienna be informed that the Society will be pleased to receive an account of his pendulum researches, and also the invariable pendulum with which they were made; and that they will defray the expenses of receiving and returning the instrument, and will cause a corresponding series of observations to be made at Philadelphia.

Dr. Bache announced the decease of Gen. Thomas Cadwalader, a member of the Society, on the 25th ult. in the 61st year of his age.

Dr. Bache reported, that by an arrangement among the Se-

cretaries, not heretofore communicated, Dr. Dunglison had been charged with the correspondence of the Society for the present year.

Stated Meeting, Dec. 3.

Present, twenty-five members.

Dr. PATTERSON, Vice President, in the Chair.

Letters were received and read—

From the Massachusetts Historical Society, dated Boston, 18th Nov. 1841; the National Institution, dated Washington, 26th Nov. 1841; H. J. Bowditch, Esq. of Boston, dated 13th Nov. 1841, and the Rev. David Thom, of Liverpool, dated 13th Oct. 1841; transmitting donations to the Society, and acknowledging the receipt of its Transactions and Proceedings.

The following donations were announced:—

FOR THE LIBRARY.

Account of the Anniversary Meeting of the Numismatic Society of London, June, 1841,—and Mr. A. J. Stothard's List of British Medals.—*From the Numismatic Society.*

Esop's Fables in Chinese. By Sloth. (Robert Thom, Esq, British Interpreter, at Canton.) 1840. Fol.—*From the Rev. David Thom.*

The Chemical Catechism, by the late Samuel Parkes, &c. &c. 13th Edition, by E. W. Brayley, Esq. of the London Institution, &c. &c. London, 1834. 8vo.—*From the Editor.*

Address before the Phi Beta Kappa Society of Bowdoin College, 2d Sept. 1841. By Alden Bradford, Esq. &c. &c.—*From the Author.*

Introductory Lecture to a Course on the Principles and Practice of Surgery, in the University of Pennsylvania, Nov. 1841. By William Gibson, M.D. &c.—*From the Author.*

Introductory Lecture to a Course on the Institutes of Medicine, in the University of Pennsylvania, Nov. 1841. By Samuel Jackson, M.D. &c.—*From the Author.*

Mr. Nuttall presented a communication, entitled "Description and Notices of New or Rare Plants, collected in a Journey over the Continent of North America, and during a Visit

to the Sandwich Islands and Upper California, by Thomas Nuttall;" which was read and referred to a committee.

Professor Henry D. Rogers read a communication by his brother, Professor William B. Rogers, and himself, entitled, "Observations on the Geology of the Western Peninsula of Upper Canada, and the Western part of Ohio;" which was referred to a committee.

The authors commence by expressing their views of the importance of determining the relations of the rocks of the western states to the formations of the Appalachian system, as they are developed in New York, Pennsylvania and Virginia. They deem this comparison essential to the full understanding of those gradations in type which elucidate the physical changes that accompanied the production of the strata. The difficulties of the investigation are then alluded to, consisting in these very changes of type, the horizontality of the rocks, the deep covering of drift which so generally conceals them, and the interruption of their range from western New York into Ohio, caused by the waters of Lake Erie.

The direct comparison of the western formation with those of the Appalachian chain being precluded by the changes which the formations undergo in the interval; it was deemed essential to establish, if possible, their relations by a continuous tracing from Pennsylvania through New York, and thence keeping some easily recognised horizon steadily in view, to work round Lake Erie through Upper Canada and Michigan, and by this means form a junction with the strata of Ohio.

Range of the Niagara Limestone.—In following some of the formations of the Niagara River, through Upper Canada, the course of the Niagara limestone, which forms the escarpment of the mountain ridge, was traced westward from Queenstown to the head of Lake Ontario. It then sweeps round the head of the lake, and again changing its strike, takes a N.N.W. direction to the southern end of Lake Iroquois, or Georgian bay of Lake Huron. A section of the formation is then given in the neighbourhood of Ancaster, about fifty miles west of Niagara. It shows a slight change in the lithological character of some of the strata, accompanied by an increase of thickness of the general mass as traced westward.

The Gypsum Shales are then traced in a belt south of the terrace, and shown to intersect the Welland Canal, and to follow the course of Grand River to the vicinity of Paris. From this point they strike north with the mountain ridge, and passing a little east of Guelph,

stretch northward towards the southern end of Lake Iroquois. At Paris some of the beds contain the characteristic hopper-shaped cavities. The well-marked vesicular or pitted limestone of the top of the formation is likewise found here.

The Vesicular Limestone is next described and traced. This is a buff coloured, impure subcrystalline limestone, distinguished by its peculiar lenticular cavities. Being remarkable for the constancy of its features and its extensive range, it proved of great importance in ascertaining the super-position of the more variable strata that adjoin it, and was thus used as a horizon from the Niagara river through Upper Canada into Michigan and Ohio. It was traced northward, from Paris to the vicinity of Guelph, and was shown to lie below the south branch of the Thames at Beachville, but to immerge in the north branch of the same river about 40 miles above London.

On the Maitland river near Lake Huron, it is well exposed, with a group of overlying limestone. Though destitute of fossils, it was readily identified at all these points.

The Rocks overlying the Vesicular Limestone in Upper Canada are stated not to accord exactly with those which repose upon this rock in New York. The important changes which this part of the series undergoes in passing from the central counties of that state to the districts west of the Genesee, being first shown by citations from the annual reports of Mr. Vanuxem and Mr. Hall, evidence was afforded of still further modifications in Upper Canada. An opinion was expressed that the corniferous and Onondaga limestones thin out entirely before crossing the peninsula to Lake Huron, and that the hydraulic and Seneca limestones must likewise vanish, or greatly change their type. On the Maitland river, near Goderich, where there is a well exposed section; the vesicular limestone forming the bottom of the group; none of the formations seen east of Buffalo could be recognised. In a section of the strata exposed in the cliffs of the Maitland, the pitted rock is described as immediately overlaid by dove coloured and bluish limestone, sometimes of a sparry texture, abounding in fossils. No attempt was made to determine with precision the relations of this formation to the strata of western New York, as no instance occurred where it was found in company with the Onondaga rock or its associates; but the opinion is expressed that it occupies a position high among the limestones which underlie the Marcellus shales. One reason for so placing the Maitland rock, is its obvious identity with the limestone of Sandusky, the infraposition of which to the Marcellus shales can readily be shown. This identity is made to rest on a comparison of fossils, and on an actual tracing of the pitted

rock and the Maitland limestone from Canada round the head of Lake Erie. Another motive for thus referring the Maitland rock, is found in the affinity which prevails between its fossils and those of the Onondaga, Seneca and Marcellus strata. Of the species examined, it contains in common with those formations, atrypa affinis, also an atrypa common at Schoharie, strophomena lineata, a delthyris, common to the Onondaga limestone and to the shales next above that rock in Pennsylvania (Marcellus shales); also cyathophillum ceratites, and a trilobite of the Onondaga limestone. Though these links indicate a somewhat near approximation in date, they are not regarded as proving the rock an equivalent of any of the formations mentioned. None of the organic remains are characteristic of any of the strata lower than the Onondaga limestone. What seems most conclusive however of the high position of the Maitland stratum, is its identity with the limestone of Sandusky, the plane of which is but little under the horizon of the Marcellus shales.

Rocks of the Detroit River, and of the western end of Lake Erie. The persistence of the pitted rock through Upper Canada being ascertained, the next point was to discover the relations of it and the overlying limestones to the strata widely developed about the head of Lake Erie. Uniting the facts collected of the dip and range of the strata in Upper Canada, with the statements contained in the annual reports of Dr. Houghton, the State Geologist of Michigan, it was inferred that a gentle axis of elevation passes in a south-south-west direction near the lower end of Lake Huron, forming the northern portion of that broad anticlinal rise of the rocks which divides the upper formations of Ohio from their equivalents in Indiana. It was therefore suspected that the pitted limestone and other strata would depart from their north-western strike, seen in Canada, and range in obedience to this axis towards the south-south-west. Should such be the case, it was hoped to unite by actual tracing the rocks of Michigan and Ohio with those of Canada and New York. Pursuing the formation south-westwardly by the borders of Detroit river, Lake Erie and the Maumee, these anticipations were realized.

The Fossiliferous Rocks of the Detroit River, both in Canada and Michigan, are readily identified by their composition and organic remains with the limestones which overlie the pitted rock on the Maitland. But the pitted rock itself in Gros Isle, at the mouth of the Detroit river, in a position proving its immediate subjacence to these strata, fortunately places this identity beyond a doubt. It is an arenaceous cream coloured limestone, abounding in the characteristic

lenticular cavities, and as usual destitute of organic remains. Its elevation above the level of the river cannot exceed eight feet: its extremely slight dip towards the north-west is perceptible.

The overlying limestones are well seen on the western side of the river, one mile from the village of Truago in Monguagon. The most common variety of the rock at this place is a light grey, somewhat sparry limestone, which becomes yellowish and mealy by weathering. It strongly resembles the limestone of the Maitland, and that seen in the bed of the Thames at Beachville. It has an inconsiderable dip towards the north-west. The same strata are displayed in a series of quarries on the Canada side, about two miles from Malden. The dip here is scarcely noticeable: if any prevails, it is westward. The Truago and Malden beds manifestly overlie the vesicular rock of Gros Isle, and agree in their fossils with the similarly placed limestone of the Maitland. They contain strophomena lineata, another strophomena, atrypa affinis, also another atrypa, septæna, orthoceratites, cyathophillum, ceratites, favosites, encrini, a trilobite, and several fossils not yet determined.

Rocks of the Maumee River and of Sandusky Bay.—On the Maumee, in Ohio, the pitted limestone is again met with, under features identical with those of the rock seen at Gros Isle and Goderich. Its occurring thus so exactly in a line with the two last named places, goes unequivocally to establish the anticlinal axis supposed to pass from the western part of Canada into Ohio. This axis crosses Lake Erie probably about midway between the head of the lake and the chain of islands stretching from Point du Playe to Point Sandusky. An examination of the fossils of the Sandusky limestone establishes beyond a question its identity with the formation exposed at Malden, Truago and Goderich. This agreement is the more interesting, since the Sandusky rock, under the name of the cliff limestone of Ohio, has by some geologists been regarded as the equivalent of the European carboniferous or mountain limestone. But an inspection of its organic remains shows that its closest foreign relations are to the Wenlock limestones of the English silurian strata. There exists moreover in Tennessee and Virginia a higher limestone, not seen in Ohio or New York, much more accurately referrible to the European mountain limestone, and so regarded by Prof. Troost, in his annual reports and other communications on the geology of Tennessee. This rock, characterized by its oolitic structure, and the beautiful genus pentremites, seems, from the descriptions given, to overlie the cliff limestone of Ohio.

The extensive anticlinal line, traced from the western side of Canada to the Maumee, crosses the Ohio river somewhere in the vicinity of Louisville, and terminates probably in Kentucky, imparting a general south-south-west strike to all the strata of western Canada, eastern Michigan, Ohio and Indiana. The lowest formation near Lake Erie which the axis elevates to the surface, is the pitted limestone. But further to the south-south-west, still lower formations appear; the cliff limestone, at the base of which we place the pitted rock, being underlaid, according to Dr. Locke, by marly shales, that rest upon an extensive formation of blue limestone, well exposed around Cincinnati. These shales are regarded by the authors of the paper as representing the gypsum shales of New York. Influenced by a certain degree of correspondence in the fossils of the Cincinnati limestone, and by other considerations, they view this latter formation to be approximately contemporaneous with the Niagara or Lockport limestone, but to include beds nowhere met with in New York. Apart from the indications afforded by the fossils, a reasonable inference is drawn from its progressive thickening westward, that it ranges at least as far as the axis on the Ohio. The Cincinnati limestone, occupying the same position below the shales under the pitted limestone, as the Niagara formation, may, if we use the term with proper restrictions, be regarded as its equivalent. In thus viewing the limestone of Cincinnati, the authors find their conclusions at variance with those of Mr. Conrad, for whose researches in Palæntology they avow the highest respect. In his last annual report, that geologist regards the limestone of Cincinnati as the equivalent or continuation of the black limestone of Trenton falls in New York. But to bring up a formation so low in the Appalachian series, the anticlinal axis must previously elevate, not only the gypseous and Niagara strata, but the prodigiously thick groups of shales, limestones, slates and sandstones, which rest above the Trenton limestone, and which, if thus elevated, would have conferred upon Ohio, Indiana and Kentucky, a wholly different geology, with a mineralogical character and physical geography unlike those which now belong to them.

In conclusion, a simple generalization is presented of the results arrived at respecting the range and distribution of the Niagara river rocks. The strata overspreading the plain, bounded by the mountain terrace, are conceived to decline gently to the south-west in Upper Canada and Ohio, while the flat but extensive anticlinal axis traverses the slope from Kentucky to the western side of Upper Canada. In these two conditions the authors find a reason, first, for the general

north-western strike of the pitted rock, which carries it in the direction of the mountain terrace to Cabot's Head and the Manitouline islands; and secondly, for that extensive south-western strike, which affects the same stratum in another outcrop as far south as the Maumee, and sends the overlying and next subjacent rocks in a broad zone from Lake Erie across the Ohio river into Kentucky and Tennessee.

Professor Bache called the attention of the Society to a Memorial to the House of Representatives of the U. S., which had been laid on the tables, soliciting the action of Congress to effectuate the reduction of the different Astronomical Observations, which are on the files of the Navy Department, or to be found in the Transactions of different learned Societies of this country; with a view to the determination of the longitude of the Capitol at Washington, and other principal stations in the United States. Professor B. explained the views expressed in the Memorial, and invited for it the signatures of the members.

Mr. Justice mentioned, that recent observations of the moon, made by him with the great telescope at the High School Observatory, confirmed the correctness of Maedeler's map of that satellite in the parts between Aristarchus and Herodotus, which are differently represented by Dermond.

Mr. Lea, from the Publication Committee, presented their annual report, detailing their proceedings during the past year.

The number of Subscribers to the published Transactions, is at this time, 109; there have been 69 copies distributed in exchange with other Societies, &c., and 15 copies sold to non-subscribers. The balance of funds in the hands of the Committee is $685.12.

Stated Meeting, December 17.

Present, twenty-three members.

Dr. CHAPMAN, Vice President, in the Chair.

Letters were received and read—

From the Royal Academy of Turin, dated 21st Aug. 1841, acknowledging the receipt of the Transactions and Proceed-

ings, and asking the renewed transmission of some numbers that are wanting to complete their sets:—

From the Chief of the Engineers of Mines of Russia, dated St. Petersburg, $^{19}/_{31}$st July, 1841, transmitting donations to the Library:—

From the Library Company of Philadelphia, dated 16th Nov. 1841, acknowledging the receipt of donations from the Society:—

From Mr. William Amies, dated Philadelphia, 10th Dec. 1841, making a donation to the Society of a painting emblematic of the American Union, executed in 1784, by order of M. Barbé de Marbois, and by him presented to Charles Thomson, Secretary of the American Congress; together with a copy of a Resolution of that Congress, passed 14th Jan. 1784, authenticated by Charles Thomson:—and

From Mr. John B. Murray, of New York, to the President, dated Liverpool, 19th Nov. 1841, offering to the Society's acceptance, as a donation from himself, the printing press on which Benjamin Franklin worked as a journeyman in London, in 1725–26.

The President was requested to express to Mr. Murray on behalf of the Society, the satisfaction with which they will receive the donation he has tendered.

The following donations were announced:

FOR THE LIBRARY.

Transits as observed, and Calculations of the Apparent Right Ascensions, 1834. London. 4to.—*From the Lords Commissioners of the Admiralty.*

Zenith Distances observed with the Mural Circle, and Calculation of Geocentric South Polar Distances, 1836. 4to. London.—*From the same.*

The Nautical Almanack, and Astronomical Ephemeris, for 1841. London, 1840. 8vo.—*From the same.*

Philosophical Transactions of the Royal Society of London, for the year 1841, Part I. London, 1841. 4to.—*From the Society.*

Proceedings of the Royal Society, 1841, No. 48. 8vo.—*From the same.*

Bessel's Refraction Tables. 4to. London.—*From the same.*

Annuaire Magnétique et Météorologique du Corps des Ingénieurs des Mines de Russie, &c. &c. St. Petersburg, 1841. 4to.—*From Count Cancrine, Chef du Corps des Ingénieurs, &c. of Russia.*

Nouveaux Mémoires de l'Académie Royale des Sciences et Belles-Lettres de Bruxelles, Tome XIII. Brussels, 1841. 4to.—*From the Academy.*

Mémoires couronnés par l'Académie Royale, &c. de Bruxelles, Tome XIV. 2me. Partie. Brussels, 1841. 4to.—*From the same.*

Académie Royale de Bruxelles:—Bulletins des Séances du 7 Oct. 1840, du 15 et du 16 Déc. 1840, du 6 Mars, 1841, du 3 Avr. 1841, du 6 et du 7 Mai, 1841, et du 5 Juin, 1841. Bruxelles, 1840–1841. 8vo.—*From the same.*

Traité Élémentaire des Fonctions Elliptiques, par P. F. Verhulst, &c. &c. Brussels, 1841. 8vo.—*From the same.*

Annuaire de l'Académie Royale de Bruxelles, 1840. Brussels, 1841. 12mo.—*From the same.*

Annuaire de l'Observatoire Royale de Bruxelles, 1841. Brussels, 1840. 12mo.—*From the same.*

Rapport Décennal des Travaux de l'Académie Royale de Bruxelles, depuis 1830; par Mr. A. Quetelet, Secrétaire Perpétual, &c. 8vo. *From the Author.*

Résumé des Observations sur la Météorologie, sur le Magnétisme, sur les Températures de la Terre, &c. &c. faites a l'Observatoire Royale de Bruxelles en 1840, par le Directeur A. Quetelet, &c. &c. Brussels, 1841. 4to.—*From the Author.*

Additional Note on the Contraction of Voluntary Muscle in the Living Body. By William Bowman, Esq. F. R. S., Demonstrator of Anatomy, &c. London, 1841. 4to.—*From the Author.*

A Few Notes on the History of the Discovery of the Composition of Water. By J. O. Halliwell, Esq. F. R. S. &c. London, 1840. 8vo.—*From the Author.*

Beiträge zur Lehre von den Haulkrankheiten. Von Dr. Th. A. O. Tellkampf. Vienna, 1839. 8vo.—*From the Author.*

Political Economy—its Uses, Objects, and Principles, &c. &c. By A. Potter, D.D. Professor, &c. in Union College. New York, 1840. 12mo.—*From the same.*

Academy of Natural Sciences of Philadelphia: List of Members and Correspondents, to 1st Sept. 1841: Proceedings, Vol. I. Nos. 7, 8. Oct. Nov. 1841.—*From the Academy.*

Catalogue of the Officers and Students of Yale College. 1841–42.—*From Professor Silliman.*

Catalogue of the Officers and Students of Dartmouth College. 1841–42.—*From Professor Hubbard.*

Charter and Laws of the Philadelphia Museum Company. 1840.—*From the Company.*

Reports on the Receipts and Expenditures of the County of Philadelphia, made by a Committee of the County Board, 13th Sept. 1841.—*From Mr. Vaughan.*

Professor Dunglison's Introductory Lecture to a Course of Institutes of Medicine, &c. in Jefferson Medical College, 1st Nov. 1841. Published by the Class.—*From the Author.*

Professor Meigs's Introductory Lecture to a Course on Obstetrics, in Jefferson Medical College, 4th Nov. 1841. Published by the Class.—*From the Author.*

Two Sermons on the Death of the Rev. Ezra Ripley, D.D. By Rev. Barzillai Frost and Rev. Convers Francis, D.D. Boston, 1841. *From Rev. Mr. Frost.*

The American Library and Intelligencer. New Series. Vol. I. No. 5. By Robley Dunglison, M.D. &c. &c. Nov. 1841.—*From the Author.*

FOR THE CABINET.

A Painting emblematic of the Union of the American States, executed 1784.—*From Mr. Wm. Amies.*

A Broad Sheet Copy of the Resolution of the Continental Congress, passed 14th January, 1784; authenticated by the autograph of Charles Thomson, Secretary.—*From the same.*

The Committee, consisting of Mr. Lea, Dr. Wood, and Professor Booth, to whom Mr. Nuttall's communication was referred at the last meeting, reported in favour of its publication among the Transactions; and it was ordered accordingly.

Mr. Espy exhibited an instrument, devised by himself, and which he calls the Nephelescope, intended to show the changes induced in the temperature of air by its greater or less rarefaction; and made several experiments with it in the presence of the Society.

Mr. Espy showed, that he was enabled by this instrument to determine the reduction of temperature, which air undergoes by expansion, whether in a dry state or when charged with moisture. He called attention to the cloud which was formed in moist air by the cold of expansion, and remarked that the latent heat evolved by this conden-

sation of vapour, counteracted the reduction of temperature produced by the expansion in a ratio which increased with the increase of temperature. Thus, he stated as the result of experiments, that an expansion occurring in air saturated with aqueous vapour, at a temperature of about 71°, produced an increase of temperature half as great as in dry air; and at a temperature of 102°, a similar expansion increased the temperature only one third as much as when the air was dry.

Mr. Espy went on to show, that by experiments made with this instrument, he had been able to make out a law, from which, when the temperature of the air and the dew point at the surface of the earth under the base of a forming cloud are known, the decrease of temperature can be determined up to the base of the cloud, and even to its top, though that should be ten miles high, as some great clouds in the summer are. And as the temperature of the air on the outside of the cloud is nearly known, being about one degree colder for every hundred yards in height, the specific gravity of the cloud can be known, when compared with that of the air surrounding it. Mr. Espy entered into a calculation to show that the air under the base of a forming cloud is colder about one degree and a quarter for every hundred yards above the surface of the earth, and that from the base of the cloud upwards it gets colder about one degree and a quarter for each two hundred yards of increased elevation. This calculation is founded on the supposition that there is an up-moving column of air under and in every forming cloud, as established in his PHILOSOPHY OF STORMS.

Mr. Espy went on to state, that it is ascertained, both by experiments made with the nephelescope and by calculations founded on the well known laws of latent heat in vapour, and specific caloric of air, that the latent caloric, given out into air by the vapour which condenses into cloud, expands the air in the cloud about 8000 cubic feet for every cubic foot of water generated in the cloud; and it is known, that it requires about 1300 cubic feet of vapour in the air to make one cubic foot of water. The difference between these quantities, or 6700 cubic feet, is therefore the actual expansion for every cubic foot of water generated from the condensing vapour. This great expansion of the air in a forming cloud, should evidently cause the air to spread out above, around the cloud, causing the barometer to rise around it, by the increased quantity of gravitating matter, and also causing the barometer to fall under the cloud, especially near the middle of the base of the ascending column, as it is known to do under great storm-clouds.

It was a remarkable fact, he said, in the history of science, that no one had adverted to a deduction from the laws of dynamics, which he deemed incontrovertible, that the wind must blow inwards on all sides of a storm, since the barometer is known always to stand low at the centre, sometimes more than two inches lower than the mean: and he went on to show that, in narrow spouts or tornadoes, where the friction of the air at the surface of the earth may be neglected, the air, following the law of spouting fluids, would spout upwards with a velocity of 240 feet per second, if the barometer should fall only one inch; and so in proportion to the square root of the fall.

Mr. Espy stated that experiments had been made, both in Great Britain and France, on dry air, similar to those which he had made with his nephelescope; but none, he believed, had ever been made with moist air, so as to compare the results together.

Finally, Mr. Espy gave a brief summary of the principles of his theory. When the air becomes heated or highly charged with vapour at the surface of the earth, it becomes lighter, and ascends in columns, comes under less pressure, expands, becomes colder by expansion, begins to condense its vapour into water or cloud, when it becomes as cold as the dew point; which it will do when it rises as many hundred yards as the dew point is below the temperature of the air in degrees of Fahr.; and the higher it goes the more vapour will it condense, the more latent heat will it give out, and the more will the cloud expand by the latent heat evolved. The more also will the barometer fall under the cloud: this will cause the air to rush towards the centre of the ascending column, where the barometer stands low: the air thus rushing in will ascend and form cloud as before, and thus the process will be continued as long as air continues to come in, highly charged with vapour. And as the storm-cloud moves over the surface of the earth, the air around is thus pressed in towards the centre of the region under the cloud, and upwards into the cload, in consequence of the diminished specific gravity of the air.

The Committee of Finance presented the Treasurer's accounts, with their annual report thereon; and the appropriations for the service of the coming year were made, in accordance with the recommendation of the Committee.

On motion of Dr. Patterson, additional authority was conferred on the Committee appointed on the 9th of August last, to make leases, &c. of the Museum Building.

Special Meeting, Dec. 31.

Present, thirty-nine members.

Mr. Du Ponceau, President, in the Chair.

The President announced the death of the venerable Treasurer and Librarian of the Society, John Vaughan, Esquire, which took place on the morning of the 30th instant, at the age of 85 years, 11 months and 14 days; and laid before the Society the following minute of the proceedings of the Officers and Council on the occasion:—

"At a special meeting of the Officers and Council of the American Philosophical Society, held on the 30th of December, 1841, Mr. Du Ponceau, President of the Society in the chair; the death of Mr. Vaughan having been announced, the following minute and resolutions were adopted on motion of Mr. Kane:—

"The Officers and Council of the American Philosophical Society, affectionately mindful of the relations that have so long and intimately subsisted between them and their venerable associate, Mr. Vaughan, direct this memorial of their feeling towards him to be entered upon their minutes.

"They remember Mr. Vaughan as the patriarch representative of the Society, its oldest member, who had for more than fifty years been an officer at this Board. They can never forget his zeal for science in all its departments, his sympathy with scientific men, and his unlimited devotion to the interests and honour of this Institution. They have proved the warmth of his social affections, and the constancy of his friendship. They have seen his active, unwearied, yet discriminating benevolence, as it extended itself through every circle; rejoicing with the happy, cheering the distressed, counselling the friendless, and succouring the needy. Like the rest of this community, they have venerated the moral beauty of his daily life; and they feel, that even in his peaceful death, he has not ceased to be a

benefactor to the city in which he lived, bequeathing to it, as he has done, the rich legacy of his admirable example, and a memory without reproach.

"*Resolved*, That a Committee of the Officers and Council be appointed to make arrangements for the funeral.

"*Resolved*, That these proceedings be reported to the Society at its special meeting, to be held to-morrow evening."

"The President appointed Dr. Chapman and Prof. Bache, the Committee under the first resolution.

"FRANKLIN BACHE, *Sec'ry*."

Dr. Chapman then presented the following preamble and resolutions; which were adopted unanimously.

The American Philosophical Society entertains the deepest sense of the loss it has sustained, in the death of its venerable and beloved associate, John Vaughan. The oldest of its members, he was also among its most diligent, faithful and efficient. Long devoted to the furtherance of its objects, he failed not at the same time to conciliate the confidence and affection of all with whom he was connected, by the elevation and moral tone of his spirit, the purity of his disposition, and the amenity of his manners. A zealous promoter of science, he was actuated by the contemplation of its inherent excellence, and tendencies to benefit the great concerns of mankind, without a single aspiration after its honours, distinctions, or emoluments. Content to occupy in the Society stations of laborious usefulness, he continued to the last moment of life to render to it services of inestimable value, and was only diverted from the exclusive advancement of its prosperity by the claims of other institutions of learning, or of charity, or of benevolence; none of which were ever presented to him, without awakening his zeal, and enlisting a share of his active exertions in their behalf. Modest and unpresuming—disinterested, generous, social, and hospitable—beneficent, cordial, and sincere—it may truly be affirmed of him, that no one was more uniformly esteemed by a singularly extensive acquaintance; and no one certainly among us has contributed more largely to the cause of humanity in its several relations, or can bequeath to this Society and

Community a brighter example to venerate and to follow. With these impressions of the character and services of its deceased associate, the Society has resolved:—

1st. That the arrangements made by the Board of Officers and Council, be approved and confirmed.

2d. That the Hall of the Society be appropriated for the reception of Mr. Vaughan's body before interment, and that his family and friends be requested to assemble there, on the occasion of his obsequies.

3d. That the members of the Society will attend the funeral, as mourners.

4th. That a member be appointed to prepare the biography of Mr. Vaughan, for publication under the auspices of the Society.

5th. That the Society will cordially co-operate with other Societies of which he was a member, or individuals approving the design, in erecting a durable monument over his grave.

6th. That the members, individually, tender their affectionate condolence and sympathy to the relatives of Mr. Vaughan, on the occasion of their common bereavement; and that the Secretaries be charged with the duty of communicating a copy of these resolutions to William Vaughan, Esq. of London, the oldest representative of his family.

Alexander Dallas Bache, Esq. one of the Secretaries, was appointed under the fourth resolution, to prepare Mr. Vaughan's Biography.